

Ultrasonographic diagnosis of intussusception in a dog

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Abstract

A three-year-old male mongrel dog was presented to the Veterinary Clinical Complex, Veterinary College and Research Institute, Namakkal, with a history of inappetence, bloody diarrhoea, lethargy and a mass protruding from the anal opening since a week. On clinical examination, a prolapsed mass with blood-tinged perianal region was observed. Hard tubular mass and pain evinced on palpation of the caudal abdomen. Moderate leukocytosis with mild hypokalemia, hyponatremia and hypochloremia was observed on haematobiochemistry. Gas filled intestinal loops with dilation of bowel proximal to the obstruction with passage of iohexol within narrow lumen as string like line were noticed on contrast radiography. On ultrasonography, bull's eye appearance of hypoechoic mass with complete loss of normal wall layering in the caudal part of intestine which suggested intestinal mass. Under general anesthesia, mid ventral celiotomy was performed and necrosed intestinal segment with ileo-colic intussusception along with mass were removed and end to end entero-anastomosis was performed. Histopathological examination of the mass revealed chronic inflammation characterized by necrosis and mononuclear cell infiltration and loss of mucosal architecture. The animal made an uneventful recovery after treatment.

Keywords: Bulls eye appearance, Intestinal mass, Intussusception, Ultrasonography

Highlights

- Ultrasonography helped to identify the intussusception site, evidence of predisposing cause and concurrent lesions.
- Hyperechoic centre completely surrounded by multiple concentric rings resembled 'target like mass' was observed on ultrasonography.
- Under general anesthesia, mid ventral celiotomy was performed and necrosed intestinal segment with ileo-colic intussusception along with mass was removed and end to end entero-anastomosis was performed.
- Histopathological examination of the mass showed chronic inflammation characterized by necrosis and mononuclear cell infiltration in the mucosa, submucosa and muscularis layer and loss of mucosal architecture.

Intestinal intussusception in humans and animals could be diagnosed accurately with the aid of ultrasonography (Penninck and Anjou, 2008). Appearance of multilayered wall and concentric ring sign is the main ultrasonographic feature of an intussusception (Gomaa *et al.*, 2012). The present case describes the usefulness of ultrasonography in differentiating intussusception from gastrointestinal tumours.

A three-year-old male mongrel dog weighing 17 kg was presented to the Veterinary Clinical Complex, Veterinary College and Research Institute, Namakkal, with a history of inappetence, bloody diarrhoea, lethargy and mass protruding from the anal opening

for a week. On clinical examination, the animal was dull, depressed, dehydrated and 2 cm prolapsed rectal mass with blood-tinged perianal region was noticed. Abdominal palpation evinced pain and hard tubular mass at the caudal abdomen. Haemato-biochemical values showed moderate leukocytosis with mild hypokalemia, hyponatremia and hypochloremia (Table 1). Radiographic examination was performed using Wipro GE 400 MA HF fixed X-ray unit. On plain radiography, gas filled intestinal loops with meniscus sign (Fig. 1) and contrast radiography with Iohexol @ 700 mg/kg BW after 30 mins showed gas filled intestine with dilation of bowel proximal to the obstruction and Iohexol passed within narrow lumen as string like line

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(Fig. 2). Ultrasonography was performed with high frequency linear transducer (7-10 MHz) as suggested by Penninck *et al.* (1989) with Esoate Mylab 40 Vet Ultrasound system. Hyperechoic centre completely surrounded by multiple concentric rings resembled 'target like mass' was observed on ultrasonography (Fig. 3). Longitudinal views revealed multiple hyperechoic and hypoechoic parallel lines (Fig. 4) and hypoechoic mass with complete loss of normal wall layering (Fig. 5) visualized in the caudal part of the intestine which suggested intestinal mass. Based on the ultrasonographic findings, it was confirmed as intussusception cranially associated with intestinal mass caudally. Surgery was performed as suggested by Fossum *et al.* (2002). Under general anesthesia, with atropine sulphate as a premedicant and induction using diazepam and propofol, maintenance was achieved with 2% isoflurane. A mid ventral incision was made



Fig. 1. Plain radiography: Gas filled intestinal loops with meniscus sign



Fig. 2. Contrast radiography: Gas filled intestinal loops with dilation of bowel proximal to the obstruction and contrast agent (Iohexol) passed as a streak through narrow lumen



Fig. 3. Ultrasonography: Ileocolic intussusception showing a hyperechoic centre completely surrounded by multiple hyperechoic and hypoechoic concentric rings resembled 'target like/ bull's eye appearance'

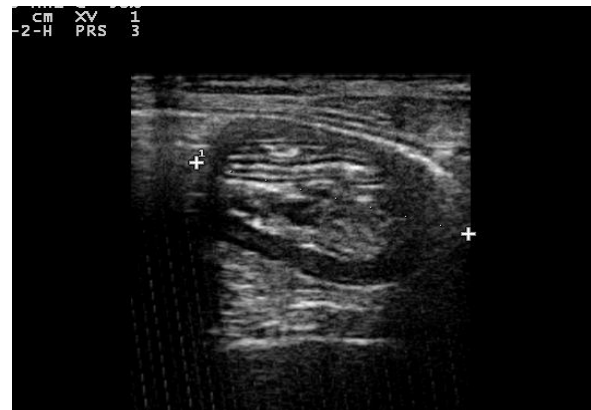


Fig. 4. Ultrasonography: Longitudinal section revealed multiple hyperechoic and hypoechoic parallel lines



Fig. 5. Ultrasonography: Lack of intestinal wall layering

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Fig. 6. The intussusception of about 13 cm length in ileo-colic segment

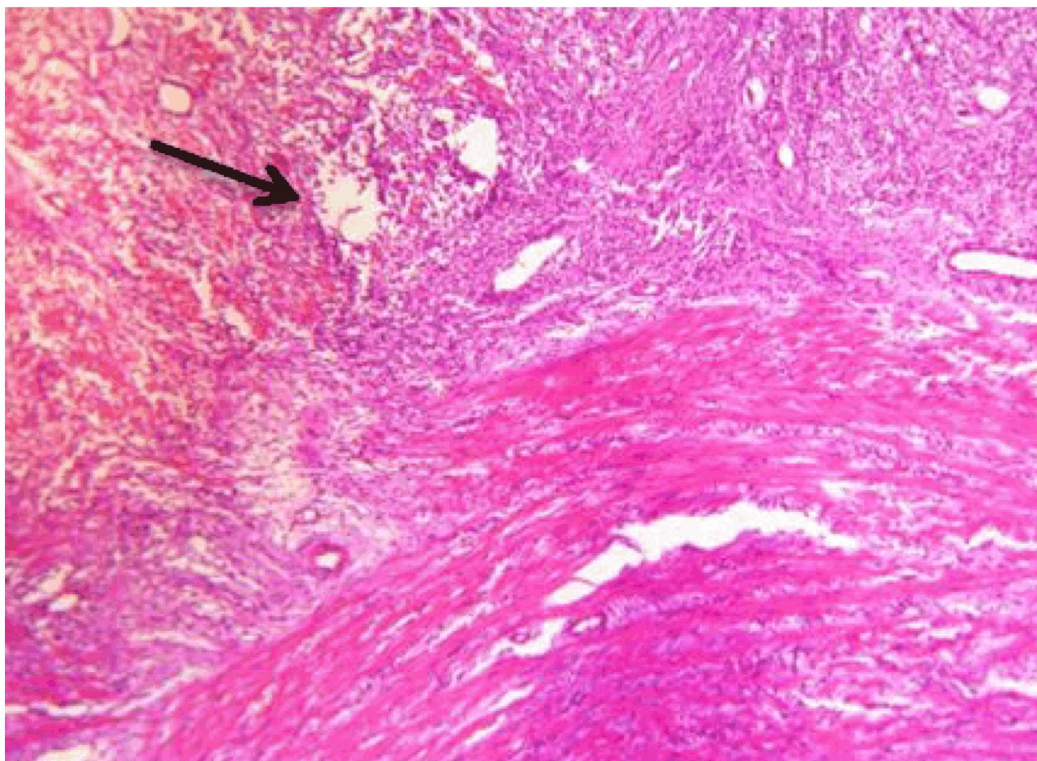


Fig. 7. Necrosis and mononuclear cell infiltration in submucosa and muscularis layer

Table 1. Haemato-biochemistry in an intussusception dog

Haemato-biochemistry	Observed values	Reference range
Hemoglobin g/dL	11.7	12-19
Packed cell volume %	39	37-57
Total erythrocyte count (x 10 ⁶ /μL)	5.87	5.0-9.0
Total leucocyte count (x 10 ³ /μL)	29.29	5.0-15.0
Neutrophils %	73	60-75
Lymphocytes %	19	18-21
Monocytes %	8	2-10
Eosinophils %	0	0-9
Basophils %	0	0-1
Platelet count (x10 ⁵ /μL)	636	1.6-5.1
Total protein g/dL	6.2	5.4-7.1
Albumin g/dL	2.8	2.3-3.3
Alanine transaminase (U/L)	32	10-109
Blood urea nitrogen (mg/dL)	7.0	8.0-28.0
Creatinine (mg/dL)	0.9	0.4-1.4
Calcium (mg/dL)	10.8	9.0-11.7
Phosphorus (mg/dL)	4.8	2.6-5.3
Glucose (mg/dL)	111	65-118
Sodium (meq/L)	134	141-152
Potassium (meq/L)	3.3	3.9-5.1
Chloride (meq/L)	100	105-115

from the umbilicus to exteriorize the intestine. The necrosed intestinal segment with ileo-colic intussusception along with mass was identified and removed (Fig. 6). The healthy segments of the intestines were anastomosed end to end using 3-0 PGA sutures in a simple interrupted pattern. The linea alba was closed with 2 PGA using a cross mattress pattern, and the skin was closed with braided silk in a cross mattress pattern. Histopathological examination of the mass in this study showed chronic inflammation characterized by necrosis and mononuclear cell infiltration in the mucosa, submucosa and muscularis layer (Fig. 7) and loss of mucosal architecture. The dog was administered with Ringer's lactate @ 10 mL/kg, ceftriaxone @ 20 mg/kg IV, prednisolone @ 1 mg/kg IM and tramadol @ 2 mg/kg SC for five days. The animal made an uneventful recovery after treatment.

Intussusception is defined as the telescoping of one part of the intestinal segment into the lumen of the adjoining segment. Inappetence, bloody diarrhoea, palpable mass in the caudal abdomen and rectal prolapse were the predominant clinical signs in dogs with intussusception (Parvathy *et al.*, 2020). Haemato-biochemical changes observed in the present case were in accordance with Jennes (2022). Gas filled intestinal loops proximal to the intussusception and passage of contrast material like a ribbon within the lumen of

intussusception aboral to the dilated bowel segment (Jennes, 2022) were similar to the observations of the present case. Concurrent or predisposing lesions of intestinal intussusception could be accurately diagnosed with the aid of ultrasonography. Ultrasonographic findings observed in the present case were inconsistent with the observations of Patsikas *et al.* (2003) and Dunn *et al.* (2021). In dogs, the diameter of the target-like mass should be normally about 18 mm (Patsikas *et al.*, 2008), but edema formation and entrapped mesentery resulted in increased diameter. A maximal diameter of 31 mm reported in the case suggested relatively long intussusception. Many intra-abdominal conditions might appear as target-like masses that could be misdiagnosed as intestinal intussusception. The completeness of the periphery and the overall ring width of more than 8 mm observed in the present case supported the accuracy of the ultrasonographic diagnosis of intestinal intussusception. In this case, accuracy of diagnosis was supported by the presence of a palpable mass in abdomen which was ultrasonographically confirmed as a target-like structure with a minimal diameter of 18 mm and so facilitated specific diagnosis. Transmural wall thickening of 10 mm, reduced motility, and

hypoechoic mass with complete loss of normal wall layers visualized in the caudal part of the intestine suggested the intestinal mass in this study. Although ultrasonography can aid in the diagnosis of different gastrointestinal disorders, histopathology is required for confirmatory diagnosis of inflammatory bowel disease and intestinal neoplasm (Danasamy *et al.*, 2019).

In this case, ultrasonography played an important role in diagnosing intussusception cranial to an intestinal mass, thus helping in early intervention and better prognosis.

Conflict of interest: None of the authors have any conflict of interest to declare.

Authors contribution: DS: Performed ultrasonography; RM: Performed histopathology; SK: Performed surgery; KS, SV, RR: Performed preliminary screening, investigation, treatment and follow-up.

Data availability statement: Raw data of this study are available from the corresponding author.

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